Vinegar Syndrome - Treatment

This article is a compilation of posts from the FCLS List Server.

From Martin Hart:

The breakdown of triacetate film base, causing the release of acetic acid vapors, can be controlled somewhat. First of all, as has been mentioned, film should not be stored in air tight containers. The process will be accelerated if this is the case.

Secondly, there is a material that will slow the process once it starts. It's a desiccant called Molecular Sieve. It chemically aDsorbs the acetic acid so that it won't continue to eat away at the film. I spent 30 years working in the refrigeration industry and molecular sieve is commonly used in filter driers for moisture and acid cleanup. Where you obtain it for the purpose of film protection I can't say offhand, but if you look in the Yellow Pages under scientific products, beakers, etc., those people can probably fix you up. It shouldn't be very expensive. Vinegar syndrome cannot be reversed but it can be brought to nearly a halt.

From Jay Pregent:

Molecular Sieves are available from FPC. They have many items that would be of intrest to us film collectors. I have delt with the company several times and have always had a good experence.

I don't have their number with me but I have a link to them on my web page:

www.capital.net/com/jaytp
(ed: unfortunately the link to FPC is dead... but visit jay's page..it's great) Using them causes you to do one thing that is the oppsite of the normal recomendations. You seal the film in low density polyetheline bags. The sieves will absorb moisture and if exposed to the humidity in the room for too long they will be worn out. Under proper storage they can last up to 5 years on a print that is showing little or no sines of the VS.

Use them before you have the VS to help prevent it before it starts.

They absorb any acetic acid that is present since the VS feeds off of itself. This slows the process down hopefully to a crawl. They also absorb moisture. Water molicules are needed for the acid to bond to in the reaction. so the less moisture, the less likely the VS will start or it will slow it down.

The down side is that such a dry film can become brittle. I have never had a film crack because of this and get around the problem by simply removing the film from the storage bags a few days before I show them to let them climatize.

From Martin Cope:

Big Reel had a reprint about the Vinegar Syndrome that covered the topic of the Molecular Sieve. What I remembered most about the article was that the Molecular Sieve was for film archivists (OK, we're all film archivists in a way), and the Molecular Sieve really dried the film out. It spoke about allowing a week to put moisture back into your film before showing it. What I was concerned about, can you be assured about getting the moisture back in when you need it?

From Frank Angel:

Any chemists out there know of an non-toxic gas that has an alkalin pH that could be released in the area around film or maybe even enclosed in a plastic bag with a reel of film that has begun to exhibit acidosis? Seems to me if you could "wash" the area where the film is stored with an alkalin gas (or is it a base that is needed -- I wish I hadn't goof around during those chemistry classes), that would be even better than the molecular sieve. And the sieves are not all that inexpensive, if you are talking about large amounts of film. I am experimenting with this substance that is sold via mail-order -- it looks like small white pebbles an it is in a mesh bag. Supposidily it absorbs moisture and odors (so presumably it will absorb the acetic acid gas) from basements. I have a box that smells like vinegar and I am going to put on of these absorbo-bags as they are called inside the box to see if it eliminates the vinegar smell. I think it is safe to assume that if the vinegar smell is gone, the acidic gas is gone and thus the catalytic reaction that the gas causes. The other scenario is that the film is still deforming away but the smell is gone. I am hoping for the former to be the case. And what about the guy who put a lay of baking soda in the bottom of his film boxes with eggshell cardboard to raise the film above it. He claimed that the baking soda not only absorbed the vinegar smell but it has a alkaline, antacid pH which naturally countacts the acid of the print.

Keeping triacetate film in tight cans is bad enough, but worst case scenario is a coating on the film that traps in any acid gaseous byproducts trying to escape. I hear from other collectors that coated prints that have typically been "rejuvinated" by a number of lab processes to get extra life out of them, turn vinegar and progress very fast. No amount of "airing out," or neutralizing with washes of base or alkali baths, seem to stop the process. So much chemical deterioration takes place that the film will not run through the projector. The reason given for this happening so swiftly and so irreversibly on the rejuvinated prints is that the coating that has been applied entraps the acid byproducts of the chemical reaction, causing it to cascade within the film base itself rather than gas-out into the environment (unlike untreated film where the gases can escape to the air). <BR. I am not a chemist and I don't pretend to understand the chemical reaction fully, other than I know what the results are; I know how to sniff out a print in which the reaction has begun (the smell of vinegar is not difficult to detect). So, what I want to know as a collector is, if Photgarding my collection will be doing more harm than good. Is the coating of such a nature that chemically it "breaths" or is it more like a plastic bag wrapped around the filmstrip, encasing it in its own self-destructive chemical reaction? I won't treat any of my collection with Photoguard until 3M answers these questions in depth and to my satisfaction. I would suggest all serious collectors do the same.

Especially, don't get taken in my those ads some application labs pass around with clips of Photogard treated film, because it DOES look and feel great. Question is, what will it look like 10 years from now. Will it go through my projector?

From David Koeggel:

NB: Please use caution if following this article and be sure to read the posts following it.

Frank: Actually, there is something that should be even more effective than baking soda (chemical name: sodium bicarbonate) or molecule sieves for absorbing moisture and vinegar. That would be sodium hydroxide, commonly known as lye. It's the principle ingredient in Drano (along with aluminum flakes and other stuff). You almost have to go to some small non-chain grocery store to buy it, like the kinds that attract many foreigners. It's next to Drano if at all. I used to buy it as a kid for my home chemistry lab. I believe the brand name was "Red Devil" or something like it. Commercially pure sodium hydroxide looks like flat, white flakes about the same size as dry parsley, but thinner than half the thickness of a dime. You would want this purer stuff. If you can only find potassium hydroxide, that's fine as well.

When lye is left out in the open, it absorbs moisture from the air and appears to melt, when in reality it is just absorbing so much moisture that it is forming a solution. Sodium (and potassium) hydroxide is an extremely powerful base, meaning it's the opposite of acid. It will readily react with acetic acid ("vinegar") to form sodium acetate (or potassium acetate), thereby neutralizing it. It is also VERY CAUSTIC. But I'd see no reason that you couldn't place a pound of it in say the bottom of a 5 gallon PLASTIC paint bucket, place some PVC pipe pieces over it, lay another smaller paint bucket lid (like from a 2 gallon one) over that -- after drilling some holes all throughout it -- and laying your reels of film on that. Plastic reels would almost be certainly required here, as the minor "fumes" would rust metal. I'd probably go with some sort of plastic mesh over that lid as well. But if you then sealed the bucket, trust me that all the moisture would be sucked dry from the film as well as would any free acetic acid (vinegar) , with that lye eventually liquifying.

I wouldn't try this with any valued prints first, though, until you feel comfortable with the process. If nothing else, it would form a very dry environment; with no water, there'd be no more catalytic breakdown of the triacetate. But it would be a very cheap "poor man's" molecular sieve, and the stuff can be dumped down the drain with plenty of water.

A couple of CAUTIONS:
1. Wear heavy rubber gloves.
2. After carefully pouring the granulated lye in the bucket, let any dust settle and wipe the upper insides of the bucket with a slightly damp cloth to collect any lye dust that might have settled there.
3. Remember that lye will burn your skin. The best test for me to see if I've got lye on my hands is to wet my hands and see if they feel slippery. If so, it's just the lye dissolving a

layer of skin off. BUT plenty of water is all that's needed to clean up.
4. The lye in the bucket will eventually liquify, so make sure that the bucket will not tip over or get kicked.
5. If you don't seal the bucket well, you'll just be absorbing moisture from the air.
6. Adding water to the lye when disposing of it will generate a lot of heat, giving you a hot lye solution.
7. Plastic goggles would be highly recommended while dealing with lye.

However, lye is very cheap, and if you aren't a painter or a drywaller (spacking comes in these same buckets), the buckets can be bought with gasketed lids at the large paint stores or found free at any construction site.

Of course, the downside is that the large reels won't fit, and that you might have a floor full of buckets after a while!

And, once the reels are taken out of this environment and exposed to humidity (which will be needed to run the now dried-out film), you've started the clock again with respect to the vinegar syndrome. However, you could take these films out of these chambers and them place them in film cans and seal them with heavy tape.

Or, for those with the space, seal them in plastic and refrigerate them, as I've done with VS IBTech 35mm reels. You can't reverse VS, only stop it.

Have I done this? No, not yet, as I haven't owned any VS prints for very long and feel I've got a little more time yet. Will I? Yes, but first with junk VS prints. The biggest hazard is if any lye "dusk" settles on the film or reels, as that dust will then absorb moisture and not only get "wet" but will then be corrosive.

How'd I get so smart about this? Chemistry major in a chemical engineering degree, as well as a boyhood love for chemistry. I've got other ideas but they deal with less common chemicals and would want to experiment first. --

From Martin Hart:

I want to express my gravest concern over any scheme that uses caustic materials to try to solve the vinegar problem. This is not something that should be done without extreme caution. The use of commercial desiccants is perfectly safe and is the only method endorsed so far by film libraries that have millions of dollars worth of film to be worried about.

From JLCAMPANA:

Just one word of caution, when you deal with lye (sodium hydroxide) , never let it get into your eyes because if it does, there is no way of washing it out because it will bind to your tissue and keep destroying it no matter how much water you use to wash it out. It will not only destroy the cornea (the clear central part of the eye), but it will also destroy

the conjunctiva (the clear tissue covering the white part of the eye) and its glands which are necessary to maintain the health of the eye. The destruction is so great that even a corneal transplant would not be effective in restoring sight. So, BE CAREFUL!